THE TAXONOMIC IDENTITY OF THE DWARF OR BLACKSPOT *CTENOPOMA* (PISCES, ANABANTIDAE) IN SOUTHERN AFRICA

by

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ABSTRACT. - Evidence is presented indicating that the dwarf or black-spot *Ctenopoma* in southern Africa is neither *C. nanum* nor *C. ctenotis*, but C. *intermedium*. A redescription and synonymy of *C. intermedium* is provided.

RESUME. - L'identité du *Ctenopoma* nain d'Afrique du Sud est discutée. Il ne s'agit ni de *C. nanum* ni de *C. ctenotis*, mais de *C. intermedium*. Une redescription et une liste de synonymes sont présentées.

Key words : Anabantidae, *Ctenopoma*, Taxonomy, South Africa, *Ctenopoma intermedium*.

Two species of the anabantid genus *Ctenopoma* occur in southern Africa (Jubb, 1967). The many-spined climbing perch *C. multispine* Peters, 1844 is more frequently encountered than the smaller black-spot climbing perch, that Jubb (1967) and others referred to as *C. ctenotis* (Boulenger, 1919). Both species are fairly widespread in tropical waters from Maputaland (north-eastern Natal) (Bruton and Kok, 1980) northwards to the Zambezi, Okavango and Zaire River systems (Gosse, 1986).

C. multispine was described from Quellimane near the mouth of the Zambezi River in Mocambique (Peters, 1844) and its taxonomic status is settled. The type locality of *C. ctenotis* is the Lukuga River to the west of Lake Tanganyika (Boulenger, 1919) (Fig. 1). In collections from southern and central Africa the blackspot *Ctenopoma* has been referred to as either *C. ctenotis* (e.g. Worthington, 1933a, b; Ricardo-Bertram, 1943; Jubb, 1963, 1967; Jackson, 1961, Skelton *et al.*, 1985) or to a closely similar species *C. nanum* Günther, 1896 (e.g. Ricardo-Bertram, 1943; Poll, 1967).

When describing *Anabas ctenotis*, Boulenger (1919) remarked that the new species was "very near *A. nanus* Gthr., from which it is distinguished by the denticulation of the gill-cover, the different anal fin-formula, and the shorter ventral fins". Subsequently several authors have questioned the independance of the two species (Worthington, 1933a, b; Ricardo-Bertram, 1943; Jackson, 1961). Detailed examination of the type specimens of *C. nanum* and *C. ctenotis* shows clearly that the two species are quite distinct, and also that *C. nanum* is similar to but not necessarily the southern African species. A comparison of specimens of blackspot *Ctenopoma* from southern Africa with type material of other nominal species of *Ctenopoma* is made in order to establish their correct identity.

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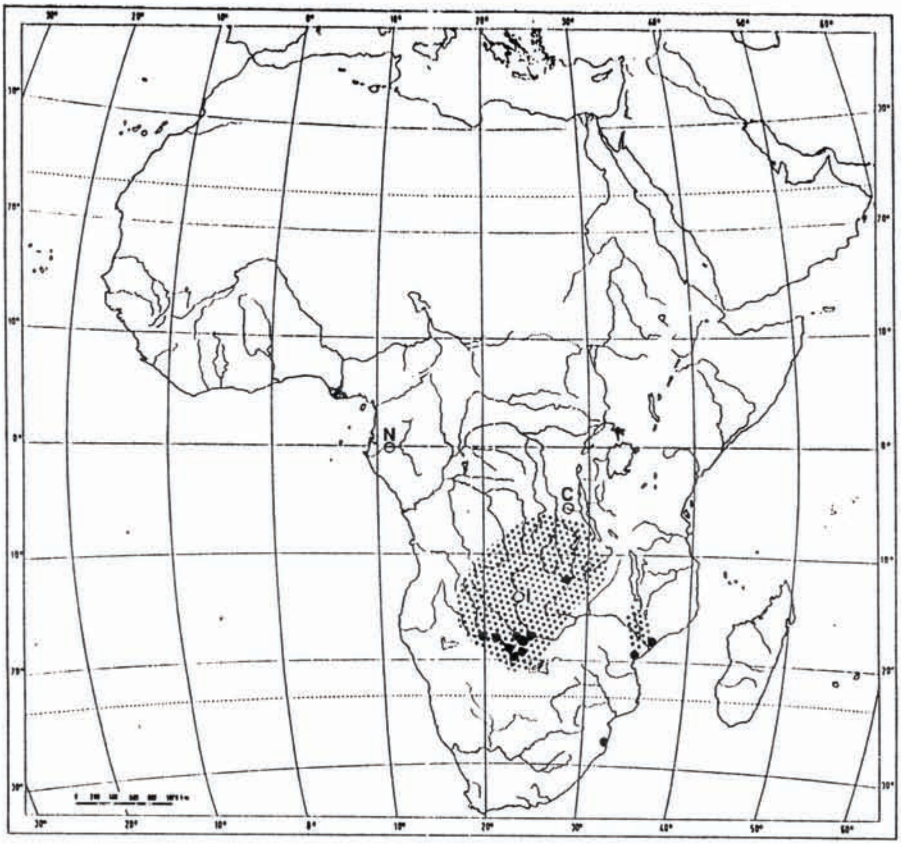


Fig. 1 : Distribution of *C. intermedium* based on literature records (shaded portion), and samples studied in this paper (closed circles). The type localities of*C. intermedium* (I), *C. ctenotis* (C) and *C. nanum* (N) are indicated.

MATERIALS AND METHODS

Linear measurements were taken with vernier calipers to the nearest 0.1 mm, according to Barel *et al.*, (1977) and Hubbs and Lagler (1958). Mouth length was measured as the length of the upper jaw i.e. along the premaxilla-maxilla axis from the median symphysis to the postero-ventral margin of the maxilla. Scale counts other than the lateral-line count includes all scales along the scale rows in which at least certain scales have tubules and pores (i.e. scales were counted even if they did not have the tubules or pores). Vertebral and other post-cranial skeletal features were taken from radiographs. Illustrations of bones were drawn with the aid of a camera lucida.

Institutional abbreviations follow Leviton *et al.*, (1985).

The following type specimens were examined and/or X-rayed: *Anabas ansorgii*: 8 Syntypes, BMNH 1912.4.1:480-487; *Anabas ctenotis*: 2 Syntypes, BMNH 1919.7.24: 33-34; *Anabas damasi*: 9 syntypes, MRAC 66011-66139; *Anabas vernayi*: 1 Syntype, TMP 15291; *Ctenopoma ashbysmithi*: Holotype, BMNH1976.10.21: 2; *Ctenopoma congicum*: Holotype, BMNH 1887.1.13: 11; *Ctenopoma intermedium*: 4 Syntypes, MNHN 1920-102, 103; *Ctenopoma* *multispine*: Holotype, MNHN 2239; *Ctenopoma nanum*: 2 Syntypes, BMNH 1868.8.16: 9-10.

Other material examined is given in Table I.

RESULTS

CTENOPOMA NANUM AND *C. CTENOTIS*.

A comparison of the type specimens of *C. nanum* Günther and *C. ctenotis* (Boulenger) is given in Table II. All the specimens are similar in length and therefore well suited for comparison with each other. Although the two species are

Table I : Collections of blackspot *Ctenopoma* examined. Abbreviations: AMG = Albany Museum, Grahamstown; RUSI = J.L.B. Smith Institute of ichthyology, Grahamstown; NMZB = National Museum, Bulawayo.

Museum N°	N	Locality	Collector	Date
AMG 4882	2	Lake Bangazi South, Natal	S J M Blaber	1976
AMG 7390	5	Hlambinyathi pan, Natal	R H Taylor	1979
AMG 3668	1	Beira, Mocambique	D Schaller	1974
AMG 6387	1	Cua Cua River, Mocambique	H Affleck	1975
AMG 19	16	Upper Zambezi River (Zambia)	G Shortridge	1938
AMG 883	2	Upper Zambezi River (Zambia)	G Bell-Cross	1963
AMG 8882	1	Upper Zambezi River (Zambia)	G Shortridge	1938
RUSI 21592	2	Mwekera River, Kafue, Zambia	D Weeks	1983
AMG 2280	2	Upper Zambezi River, Caprivi	B Van der Waal	1973
AMG 2282	8	Upper Zambezi River, Caprivi	B.Van der Waal	1973
AMG 2412	3	Nsundwa, Caprivi	B Van der Waal	1973
AMG 2823	11	Namalubi, Caprivi	B Van der Waal	1975
AMG 3119	7	Upper Zambezi River, Caprivi	B Van der Waal	1975
AMG 3124	11	Upper Zambezi River, Caprivi	B Van der Waal	1975
AMG 3158	7	Sivilo, Caprivi	B Van der Waal	1975
AMG 3173	1	Linyanti, Caprivi	B Van der Waal	1975
AMG 3367	1	Caprivi	B Van der Waal	1975
RUSI 24228	7	Kwando River, Caprivi	B Van der Waal	1985
AMG 5695	10	Nyangona, Okavango River, SWA	B Van der Waal	1977
AMG 5760	1	Katere, Okavango River, SWA	B Van der Waal	1977
AMG 5978	8	Muhango, Okavango River, SWA	B Van der Waal	1977
RUSI 18697	1	Nxamaceri, Okavango, Botswana	M N Bruton	1983
RUSI 19760	1	Moremi Game Reserve, Botswana	G S Merron	1983
RUSI 23114	2	Moremi Game Reserve, Botswana	G S Merron	1984
RUSI 23909	6	Seronga, Okavango, Botswana	G S Merron	1985
RUSI (not acces.)	2	Seronga, Okavango, Botswana	GS Merron	1985
NMZB 3918	1	Xaxaba, Okavango, Botswana	J Minshull	1983

superficially similar, a number of substantial differences in both morphometric and meristic measurements are clearly evident. *C. ctenotis* has a longer predorsal length than *C. nanum* and this correlates with a higher number of supraneural bones in the former species (*C. ctenotis* 3/4 vs *C. nanum* 1/2) (Fig. 2). *C. nanum* has a greater depth of the head than *C. ctenotis* but a relatively smaller eye and narrower interorbital distance. Its mouth is comparatively larger than that of *C. ctenotis*. In qualitative terms it was found that *C. nanum* has a shorter, steeper predorsal profile and the head has a more angulate profile compared to the rounded features of *C. ctenotis*. The eyes are supero-lateral in *C. nanum* but lateral in *C. ctenotis*.

Differences are not confined to the head region only. *C. nanum* is more compressed than *C. ctenotis* (i.e. it has a narrower body) and the caudal peduncle is longer when measured directly. *C. ctenotis* has fewer dorsal fin soft rays which results in a relatively shorter length to the base of this fin for the species. The anal fins differ in both spines and soft rays and counts of rays in the pectoral and caudal fins also differ. In caudal fin counts *C. ctenotis* is distinct among the *Ctenopoma* specimens examined for this study in having 8+8 principal caudal fin rays, all the other species have 7+7 principal caudal fin rays. *C. nanum* has relatively smaller scales than *C. ctenotis* although the longer predorsal length of the latter increases the predorsal scale count accordingly. Finally, as noted by Boulenger (1919) the denticulations on the gill cover (operculum and suboperculum) of *C. ctenotis* are well developed in comparison with *C. nanum*.

It is clear from this comparison that there are substantial differences between the type specimens of these two species and, therefore, no grounds for considering them as conspecific.

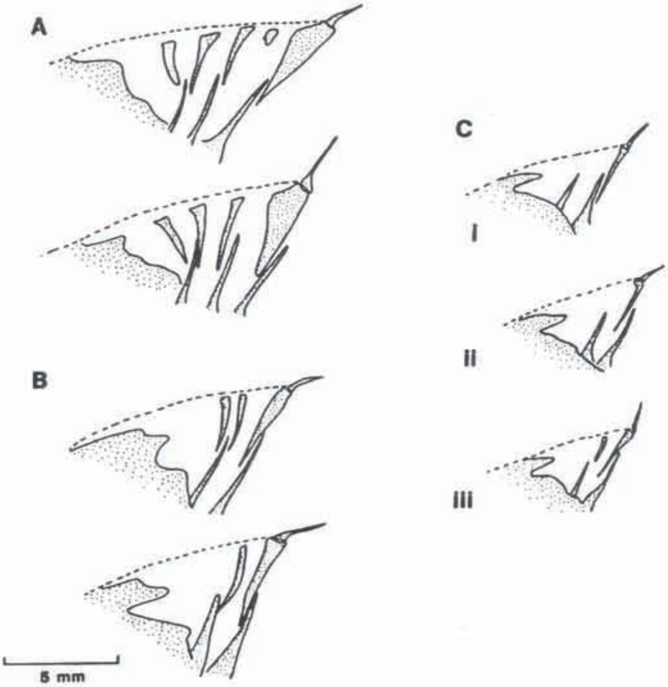


Fig. 2 : Supraneural bones of (A) types of *C. ctenotis*, (B) types of *C. nanum* and (C) specimens of *C. intermedium*, i - AMG 7390, ii - AMG 3918, iii - RUSI 18697. Drawn from radiographs with a camera lucida.

THE IDENTITY OF THE SOUTHERN AFRICAN "BLACKSPOT" *CTENOPOMA*.

A comparison of morphometric and meristic measurements of the southern African blackspot *Ctenopoma* from various localities with the types of three species to which it has been referred is given in Tables II, III, IV, V, VI and VII. The three described species are *C. nanum* Günther, *C. ctenotis* (Blgr.), and *C. intermedium* (Pellegrin).

C. intermedium was described by Pellegrin (1920) from four specimens collected by V. Ellenberger from Lealui on the Upper Zambezi River. Pellegrin (1920) considered that the species was close to *C. nanum* and *C. ansorgii* (Blgr.). In most respects the measurements of the types of *C. intermedium* agree more closely with those of *C. nanum* than with *C. ctenotis* (Tables II, III, IV, V, VI). The main obvious difference between *C. intermedium* and *C. nanum* is in the length of the mouth of the two species, which is relatively larger in *C. nanum* than either *C. ctenotis* or *C. intermedium*. *C. intermedium* is also a more slender species than the other two and has a slightly less deep caudal peduncle. It is also clear from Tables V, VI and VII that there is usually a broad range of infraspecific variation in many meristic characters of the blackspot *Ctenopoma*. Until such time as a complete revision can be made of both *C. nanum* and *C. ctenotis*, the differences between the type specimens and the southern African species provide support to recognise *C. intermedium* as distinct from the other two species.

Other dwarf of shallow-bodied *Ctenopoma* species known from the Zaire River system include *C. ansorgii* (Blgr.), *C. congicum* Blgr., and *C. davidae* Poll. *C. damasi* (Poll and Damas, 1939) from the Lake Edward basin is another species in this group. These species are all similar with overlapping morphometric and meristic ranges (Table III) but most appear to have diagnostic features that preclude their synonymy with *C. intermedium*: e.g. *C. ansorgii* has distinct pigmentation and colour; *C. davidae* has high numbers of dorsal (XIX) and anal fin (XI-XII) spines; *C. congicum* is very similar in meristic characters but differs in reaching a larger size (up to 85 mm SL vs 50-55 mm SL for *C. intermedium*) and in pigmentation and colour; *C. congicum* has isolated pale and dark scales and the dorsal and anal fins are yellowish to green with numerous brown spots on their membranes towards the bases (Sterba, 1973); *C. damasi* differs in the number of caudal vertebrae and in the number of dorsal and anal fin spines.

C. ashbysmithi Banister and Bailey has small scales, a high number of dorsal spines (XVIII-XX), opercles without multiple series of spines and pigmentation in the form of chain-like vertical bands. It was thought to be a dwarf species by Banister and Bailey (1979) but this is unlikely as it clearly shows great similarity to the larger *C. multispine* Peters, especially to juveniles of a similar size (Table III, pers. obs.). The vertebral characteristics of *C. ashbysmithi* place it in the same group as *C. multispine* as distinct from the group of dwarf species.

The data in Tables IV, V, VI and VII support the conspecificity of southern African blackspot *Ctenopoma* with Pellegrin's *C. intermedium*. The mean values for the measurements of specimens from the Caprivi-Okavango area are generally close to the value for the single type specimen measured in all respects except for the orbit diameter. There is however a large standard deviation for the mean of the orbit diameter for the total sample measured (Table IV), indicating a broad intraspecific variation (possibly through allometry).

A good indication of the full range of variation for meristic values is provided by the distribution frequency plots of these characters for samples derived from a wide geographic distribution (Tables V, VI, VII). Additional indication of the extent of the infraspecific variation of this species is shown in the data presented by Poll (1967) for *C. nanum* from Angola. Poll (1967) refers specimens to two colour forms of the species, those with a marbled pattern and those with a transverse banded pattern. In the material examined from southern Africa only the banded

Table II : Morphometric and meristic measurements of the type specimens of *C. ctenotis*(BMNH 19197.24.33-34) and *C. nanum* (BMNH 1868.8.16.9-10). Measurements as % SL or % Head length (*).

Measure	*C. ctenotis*		*C. nanum*	
Standard length mm	53,0	55,0	51,0	52,0
Predorsal	44,3	43,6	38,2	36,5
Head l.	38,1	35,5	34,9	35,4
Head depth *	73,3	71,8	84,3	84,8
Snout l.*	20,8	22,1	20,8	21,7
Orbit diameter*	23,8	23,6	23,0	22,8
Interorbit l.*	26,0	25,6	21,9	20,7
Postorbit l.*	59,9	61,5	59,0	59,8
Mouth l.*	27,2	28,2	38,2	38,0
Body depth	36,2	34,7	35,7	36,9
Body width	20,9	20,6	18,4	19,2
Caudal peduncle l.*	3,4	3,6	4,5	5,0
Caudal peduncle d.	17,4	16,0	17,5	17,7
Dorsal fin base	57,6	57,3	62,8	61,0
Anal fin base	40,0	39,1	37,8	35,5
Pectoral fin l.	24,9	23,6	24,1	23,5
Pelvic fin l.	20,8	19,1	25,5	
Scales				
Lateral line	27	26	29	28
Caudal peduncle	17	17	18	18
Predorsal	20	20	13	13
LL - dorsal fin	3	3	4	5
LL - pelvic fin	8	8	8	8
Fin rays				
Dorsal fin	XV + 7	XVI + 8	XV + 10	XVI + 9
Anal fin	X + 8	X + 8	VIII + 10	VIII + 9
Pectoral	13	13	14	15
Pelvic fin	I + 5	I + 5	I + 5	I + 5
Caudal fin	16	16	14	14
Vertebrae	26	26	26	26
Precaudal	11	11	9	9
Caudal	15	15	17	17
Predorsal	2	3	1	1
Preanal	11	11	9	9
Supraneural bones	3	4	2	1
Gill rakers	7	5	8	7

pattern is found but there is individual variation in terms of the intensity and number of bands and the expression of the caudal spot. This variation is present within samples and no overall geographic distribution of colour or pigment pattern types is evident.

SPECIES DESCRIPTION

The following re-description of *C. intermedium* (Pellegrin) is based on the type specimens and material detailed in Table I. A specimen from the Hlambinyathi Pan in Maputaland (AMG 7380) is shown in Fig. 3.

Ctenopoma intermedium (Pellegrin, 1920).

Syntypes: MNHN 1920-102-103. 4 specimens, 47.5 mm SL, 35 mm SL, 34.5 mm SL, 33 mm SL. Collected by V. Ellenberger, Lealui, Barotseland, Upper Zambezi.

Synonymy: *Anabas intermedium* Pellegrin, 1920: 151-152; *Ctenopoma intermedium*: Gosse, 1986: 407; *Ctenopoma nanum* (non Günther): ? Ricardo-Bertram, 1943: 215; Poll, 1967: 317-318, Fig. 154; *Ctenopoma ctenotis* (non Boulenger): all references from the Okavango Zambezi River system as given in Gosse (1986); Blaber, 1978: 63; Taylor, 1982: 205.

Diagnosis: *Ctenopoma intermedium* differs from *C. ctenotis* in having a shorter predorsal length, a shorter but deeper head, a more slender body and a longer base to the dorsal fin. It has fewer anal fin spines (*C. intermedium* VII-IX vs *C. ctenotis* X), fewer principal caudal fin rays (7+7 vs 8+8), generally fewer predorsal vertebrae (1-2 vs 2-3), precaudal (9-10 vs 11) vertebrae, and fewer supraneural bones (0-1 vs 3-4) (see Fig. 2). *C. intermedium* is similar to *C. nanum* but differs from this species in having a smaller mouth, a more slender body, and a longer anal fin base.

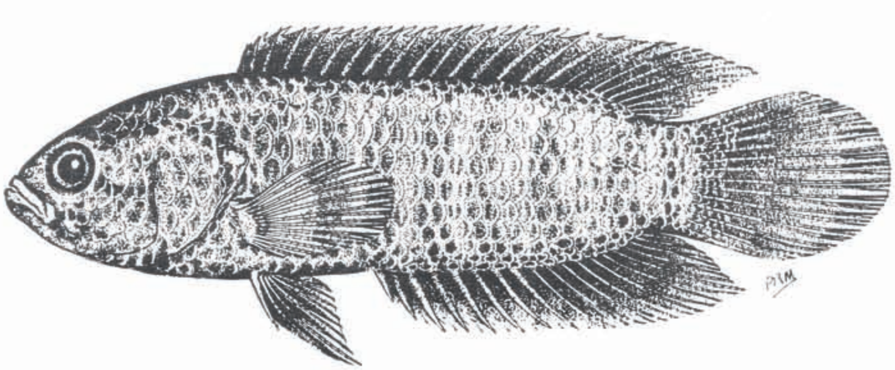


Fig. 3 : *Ctenopoma intermedium* (Pellegrin), AMG 7390, male 41 mm SL, from Hlambinyathi Pan, Natal. Illustration by Penny Meakin.

Table III : Distribution frequency of vertebral counts and of the number of dorsal and anal fin spines and rays of the types of certain African *Ctenopoma* species. Specimens as listed under Materials and Methods. A - total vertebrae; B - abdominal (precaudal) vertebrae; C - caudal vertebrae; D - predorsal vertebrae; E - preanal vertebrae; F - supraneural bones; G - dorsal fin spines; H - dorsal fin soft rays; I - anal fin spines; J - anal fin soft rays.

	A Total vertebrae								B Abdominal vertebrae				
Species (types)	**N**	**26**	**27**	**28**	**29**	**30**	**31**		**9**	**10**	**11**	**12**	**13**
C. ansorgii	8		8						8				
C. congicum	1		1						1				
C. ctenotis	2	2								1	1		
C. damasi	9		9						9				
C. intermedium	4	3	1						3	1			
C. nanum	2	2							2				
C. ashbysmithi	1						1						1
C. multispine	1						1					1	
C. vernayi	1						1					1	

	C Caudal vertebrae								D Predorsal vertebrae				
Species (types)	**N**	**15**	**16**	**17**	**18**	**19**			**0**	**1**	**2**	**3**	
C. ansorgii	8				8					8			
C. congicum	1				1					1			
C. ctenotis	2	1	1								1	3	
C. damasi	9				9					6	3		
C. intermedium	4			4					1	3			
C. nanum	2			2						2			
C. ashbysmithi	1				1							1	
C. multispine	1					1						1	
C. vernayi	1					1						1	

	E Preanal vertebrae								F Supraneural bones				
Species (types)	**N**	**9**	**10**	**11**	**12**	**13**			**0**	**1**	**2**	**3**	**4**
C. ansorgii	8	8							2	5	1		
C. congicum	1	1									1		
C. ctenotis	2		1	1								1	1
C. damasi	9		9							6	3		
C. intermedium	4	1	3						1	3			
C. nanum	2	2								1	1		
C. ashbysmithi	1					1			1				
C. multispine	1				1				1				
C. vernayi	1					1			1				

Table III

Species (types)	G Dorsal fin spines								H Dorsal fin rays				
	N	XV	XVI	XVII	XVIIII	IXX	XX		6	7	8	9	10
C. ansorgii	8				8				2	6			
C. congicum	1			1							1		
C. ctenotis	2	1	1								2		
C. damasi	9			2	7					5	3		
C. intermedium	4	1	2		1						1	3	
C. nanum	2	1	1								2		
C. ashbysmithi	1												1
C. multispine	1			1			1						1
C. vernayi	1				1								1

Species (types)	I Anal fin spines								J Anal fin rays				
	N	VIII	IX	X	XI	XII	XIII		7	8	9	10	
C. ansorgii	8				8				5	3			
C. congicum	1				1							1	
C. ctenotis	2			2						2			
C. damasi	9				8		1		1	6	2		
C. intermedium	4	1	3							1	3		
C. nanum	2	2										2	
C. ashbysmithi	1		1									1	
C. multispine	1		1									1	
C. vernayi	1		1								1		

Description: Morphometric and meristic values of *C. intermedium* are given in Table IV. The species has a slender elongate body with a rounded caudal and a obtusely pointed head. The head is 1.2 times longer than deep and has a gently convex (moderately curved) predorsal profile. The eyes are relatively small (four to four and a half times in head length), placed far forward on the head, supero-lateral in position. The snout is short, sub-equal to the orbit diameter. The nostril openings are widely spaced, the tubular anterior opening above the maxillary groove and the pit-like posterior opening alongside the antero-dorsal edge of the orbit. The snout is slightly prognathous (i.e. the mouth supero-terminal). The mouth is small (three to four times in head length), reaches to below the anterior half of the eye and is upturned at about 35 degrees to the horizontal. The lips are even, well developed and moderately fleshy. The gill membrane forms an angle of 50 degrees to the body, is deeply cleft but continuous and free below. The operculum edge with an ovoid notch and two series of short spines, one above and one below the notch (Fig. 4). The suboperculum with or without a series of short spines (usually about five or six but as many as 12 have been counted on individual specimens). The cephalic lateral line system is well developed with five preopercular, four mandibular, six infraorbital, five supraorbital and two supratemporal pores.

The head is largely covered with cycloid or ctenoid scales with the exception of the snout, the preorbital region and the gular region. Scales above to between the posterior openings of the nostrils are cycloid; postorbital (cheeks) region as far as

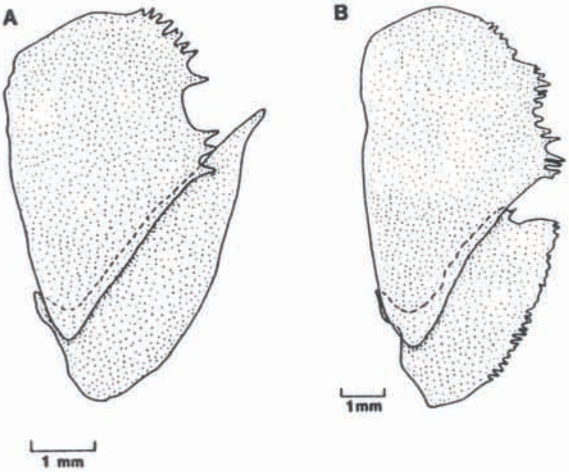
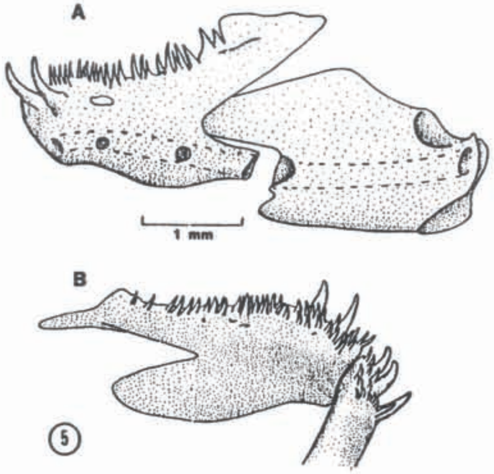


Fig. 4 : Left hand opercle and subopercle bones of two specimens of *C. intermedium* to show variation in denticles. (A) RUSI not accessioned, SL 35 mm, Seronga, Botswana, (cleared and stained), (B) AMG 19, 46 mm SL, Upper Zambezi (dissected).



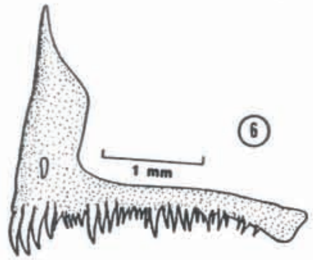


Fig. 5 : (A) Lateral view of left lower jaw and (B) postero-dorsal view of left dentary and medial portion of right dentray of *C. intermedium*, RUSI not accessioned, 35 mm SL, Seronga, Botswana (cleared and stained).

Fig. 6 : Lateral view of left premaxilla of *C. intermedium*, RUSI not accessioned, 35 mm SL, Seronga, Botswana (cleared and stained).

the rictus of the mouth with three to five rows of ctenoid scales; operculum with three rows of ctenoid scales.

The teeth are all caniniform and curved and are set on the lower jaw in two groups or series (Fig. 5a, b): an outer terminal series of four to six large teeth and an inner series extending along the ramus of small teeth arranged irregularly from one to three or four deep. Teeth on the premaxilla are similar in shape with five or six larger anterior teeth extending to a series of irregularly sized but smaller teeth one or two deep along the rim of the bone (Fig. 6).

Table IV : Morphometric proportions of the types of *Ctenopoma intermedium* (MNHN 1920-102,103) and of specimens of *C. intermedium* from southern Africa; measures as % SL or % Head l. (*).

Measure	*C. intermedium* (n = 4)		Natal (n = 7)		Caprivi (n = 58)	
	Mean	SD	Mean	SD	Mean	SD
Standard length mm						
Predorsal	39,1	0,4	37,5	0,9	39,4	3,2
Head 1.	32,8	1,4	34,5	1,3	34,7	1,1
Head depth *	86,0	2,9	78,2	2,4	79,6	3,6
Snout 1.*	21,2	1,2	19,9	1,9	20,4	2,4
Orbit diameter *	25,5	1,5	24,5	1,9	28,0	3,4
Interorbit 1. *	23,7	0,4	22,4	1,4	22,5	2,4
Postorbit 1. *	58,4	0,7	54,6	1,9	54,5	3,4
Mouth 1. *	30,8	1,8	29,6	2,6	29,7	2,6
Body depth	33,3	1,3	30,5	0,7	31,7	1,8
Body width	16,7	1,8	19,2	0,8	19,0	1,5
Caudal peduncle 1.	7,1	0,7	4,0	1,9	5,1	1,4
Caudal peduncle d.	15,9	0,9	14,5	3,1	15,4	1,2
Dorsal fin base	62,6	1,4	60,9	2,3	60,4	2,3
Anal fin base	41,3	0,3	39,5	2,4	38,4	2,4
Pectoral fin 1.	22,5	1,3	22,0	1,1	22,4	1,5
Pelvic fin 1.	11,5	1,1				

Measure	Upper Zambezi (n= 2)		Kwando (n = 7)		Okavango (n = 9)		Kafue (n = 2)	
	1	2	Mean	SD	Mean	SD	1	2
Standard length mm	50,5	50,6					28,8	26,2
Predorsal	37,0	36,2	38,3	1,9	39,4	3,2	39,2	40,5
Head 1.	33,5	32,2	33,6	1,3	35,3	0,8	34,7	35,5
Head depth *	83,2	75,5	80,6	3,7	78,4	3,8	78,0	75,3
Snout 1.*	21,6	22,7	18,7	0,8	19,9	1,7	18,0	21,5
Orbit diameter *	22,2	22,1	28,1	2,0	27,6	3,0	25,0	28,0
Interorbit 1. *	23,4	23,9	21,8	4,2	21,6	1,1	17,0	18,3
Postorbit 1. *	56,3	57,1	57,5	4,5	56,1	2,8	53,0	54,9
Mouth 1. *	33,5	33,1	30,2	2,3	29,9	3,5	29,0	29,0
Body depth	32,7	29,8	29,2	1,9	31,9	1,6	31,3	31,3
Body width	18,2	18,6	17,6	1,2	18,5	1,3	20,1	18,7
Caudal peduncle 1.	4,6	4,7	4,2	1,3	6,0	1,4	5,9	5,7
Caudal peduncle d.	16,0	16,2	15,4	1,2	15,5	0,9	15,6	15,7
Dorsal fin base	62,8	58,5	60,3	2,0	59,7	2,5		
Anal fin base	37,4	37,9	36,5	2,1	38,0	2,6		
Pectoral fin 1.	21,8	22,7	21,7	1,6	21,6	2,0	24,7	31,3
Pelvic fin 1.	10,5	10,1	9,8	0,9	10,6	0,9	8,3	9,2

Table V : Distribution frequency of gill rakers and fin rays of types of *C. ctenotis*, *C. nanum*, *C. intermedium* and the blackspot *Ctenopoma* from southern Africa. A) gill rakers, B) pectoral fin rays, C) dorsal fin rays, D) anal fin rays. Natal: AMG 4882 (2), AMG 7390 (5); Mocambique: AMG 3668 (1), AMG 6387 (1); Upper Zambezi: AMG 883 (2); Kafue: RUSI 21592 (2); Caprivi: AMG 2280 (2), AMG 2412 (3), AMG 3119 (7), AMG 3124 (11), AMG 3158 (7), AMG 3173 (1); AMG 3367 (1); AMG 2282 (8), Kwando: RUSI 24228 (7); Okavango AMG 5695 (10), AMG 5760 (1), AMG 5878 (9), RUSI 19760 (1), RUSI 18697 (1), RUSI 24228 (8), NMZZ 3918 (1).

Types/Local.		A Gill rakers					B Pectoral fin rays					
	N	**4**	**5**	**6**	**7**	**8**	**10**	**11**	**12**	**13**	**14**	**15**
Types *C. ctenotis*	2		1		1					2		
C. nanum	2				1	1					1	1
C. intermedium	4			1					3	1		
Natal	7			2	5				1	4	1	1
Mocambique	2				2			1			1	
Upper Zambezi	2				2					1		
Kafue	2				1	1					2	
Caprivi	31		9	17	5		1	7	15	8		
Kwando	7			6	1			2	2	3		
Okavango	20	1	6	11	1			2	2	9	1	
C Dorsal fin rays		Spines					Soft rays					
Types/local.	**N**	XIV	XV	XVI	XVII	XVIII	**6**	**7**	**8**	**9**	**10**	**11**
Types *C. ctenotis*	2		1	1				1	1			
C. nanum	2		1	1						1	1	
C. intermedium	4		1	2		1		1		3		
Natal	7		2	5					2	5		
Mocambique	2		1		1				2			
Upper Zambezi	2		1		1				1			
Kafue	2			1	1					1		1
Caprivi	31		8	21	2			4	13	11	3	
Kwando	7		3	4				5	1	1		
Okavango	23	1	10	10	2		4	5	4	9	1	
D anal fin rays		Spines				Soft rays						
Types/local.	**N**	VII	VIII	IX	X	**6**	**7**	**8**	**9**	**10**	**11**	
Types *C. ctenotis*	2				2			2				
C. nanum	2		2						1	1		
C. intermedium	4		1	3				1	3			
Natal	7	2	4	1			1	1	3	2		
Mocambique	2	1		1			1			1		
Upper Zambezi	2	1			1			1	1			
Kafue	2		2					1	1			
Caprivi	31	3	16	11	1		7	5	12	5	2	
Kwando	7	4	1	2			4	1	2			
Okavango	23	4	8	11		3	2	7	6	3	2	

Table VI : Distribution frequency of scale counts of the types of *C. ctenotis*, *C. nanum*, *C. intermedium* and the blackspot *Ctenopoma* from southern Africa. A - lateral line scales (total); B - lateral line to dorsal (anterior); C - lateral line to pelvic fin; D - caudal peduncle scales; E - predorsal scales. Material as given in Table 5.

	A Total lateral-line scales											
Types/Local.	**N**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**			
Types *C. ctenotis*	2				1	1						
C. nanum	2						1	1				
C. intermedium	3 (4)						1	2				
Natal	7			6				1				
Mocambique	2	1					1					
Upper Zambezi	2						1					
Kafue	2						1		1			
Caprivi	31				8	8	5	1	9			
Kwando	7			3		2	2					
Okavango	20			1	8	5	6					

	B Lateral line to dorsal						C Lateral line to pelvic					
Types/local.	**N**	**3**	**4**	**5**				**7**	**8**	**9**		
Types *C. ctenotis*	2	2							2			
C. nanum	2		1	1					2			
C. intermedium	3 (4)	1	2						3			
Natal	7	1	6					1	6			
Mocambique	2	1	1						1	1		
Upper Zambezi	2		2						1	1		
Kafue	2	1	1						2			
Caprivi	31	12	19					3	28			
Kwando	7	3	4					2	4	1		
Okavango	20	13	7					1	17	2		

	D Caudal peduncle scales						E Predorsal scales						
Types /local.	**N**	**14**	**15**	**16**	**17**	**18**	**10**	**11**	**12**	**13**	**14**	**15**	**16/20**
Types *C. ctenotis*	2				2								2
C. nanum	2					2				2			
C. intermedium	4	1	2		1						1	1	2
Natal	7	7							1	2	3		1
Mocambique	2	2							1				1
Upper Zambezi	2	1		1							1		1
Kafue	2	1		1							1	1	
Caprivi	31	27	1	3			2		5	5	12	5	2
Kwando	7	7									1	1	5
Okavango	20	19	1				1		1	6	3	5	4

Table VII : Distribution frequency of vertebrae and supraneural bones of the types of*C. ctenotis*, *C. nanum*, *C. intermedium* and the blackspot *Ctenopoma* from southern Africa. A - total vertebrae; B - abdominal (precaudal) vertebrae; C - caudal vertebrae; D - predorsal vertebrae; E - preanal vertebrae; F - supraneural bones. Material as given in Table 5.

		A Total vertebrae					B Abdominal (Precaudal)					
Types/Local,	**N**	**25**	**26**	**27**	**28**			**8**	**9**	**10**	**11**	
Types *C. ctenotis*	2		2								2	
C. nanum	2		2						2			
C. intermedium	4		3	1					3	1		
Natal	7	2	5						6	1		
Mocambique	1		1						1			
Upper Zambezi	18	1	12	4	1			2	14	1	1	
Kafue	2			2						2		
Caprivi	51	3	34	14				2	47	1	1	
Kwando	7		4	3				5	2			
Okavango	23	1	15	7				1	19	3		

		C Caudal vertebrae					D Predorsal vertebrae					
Types/local.	**N**	**15**	**16**	**17**	**18**	**19**		**0**	**1**	**2**	**3**	
Types *C. ctenotis*	2	2								1	1	
C. nanum	2			2					2			
C. intermedium	4			2				1	3			
Natal	7		3	4					2	5		
Mocambique	1			1					1			
Upper Zambezi	18			13	5				15	3		
Kafue	2			2					2			
Caprivi	51		4	33	14				41	10		
Kwando	7			1	4	2			6	1		
Okavango	23		3	13	7				19	4		

		E Preanal vertebrae						F Supraneural bones				
Types /local.	**N**	**7**	**8**	**9**	**10**	**11**		**0**	**1**	**2**	**3**	**4**
Types *C. ctenotis*	2					2					1	1
C. nanum	2			2					1	2		
C. intermedium	4			1	3			1	3			
Natal	7			6	1			5	2			
Mocambique	1			1					1			
Upper Zambezi	18		2	14	1	1		1	13	4		
Kafue	2				2				2			
Caprivi	51	5	8	37	1			9	37	2	2	
Kwando	7			4	3			2	3	2		
Okavango	23		2	20		1		8	12	2	1	

The gill rakers are very short and stubby. The labyrinth organ is simple, in the form of a single smooth-edged curved lamellum.

The body is ovoid in anterior cross-section becoming more compressed posteriorly. The caudal peduncle is short and deep (3.5 times deep as long). The dorsal fin origin lies above the hind edge of the head. It is long-based and even in height along its length. The anal fin originates from opposite the middle of the spinous portion of the dorsal fin, and is long-based and even in height along its length. The pectoral fins are rounded. The pelvics have a leading spine that is less than 50% of the length of the fin and are pointed with the tips extended in mature male specimens. The caudal fin is rounded. The body is scaled in even regular rows of ctenoid scales. The dorsal and anal fins have a sheath of one or two rows of small scales and the base of the caudal fin is covered with small scales. The incomplete lateral line is divided and straight with a single row of scales between the upper and lower portions.

In life *C. intermedium* is usually a deep chocolate brown with darker vertical bars on the body and behind the eye as well as a dark spot at the base of the caudal fin. The dorsal and anal fins are dark brown, almost black with the tips of the lappets between the spines are often white. The pectoral fin has brown rays and a clear membrane. The pelvic fin may be uniformly dark brown or black or have creamish outer portions (the spine and inner rays) and a dark brown or black mid-section extending to the tips of the longer rays. Preserved specimens are similar to the above description but there is some variation in the expression of the caudal spot, post-ocular bars and the number and intensity of the body bars. The number of bars on the body may vary from seven or eight to as many as 12 or 13. There appears to be no strict geographic pattern in this variation e.g. some specimens in a single sample may have the caudal spot and others not.

Distribution: The distribution of *C. intermedium* is shown in Fig. 1. It occurs in the Okavango (Skelton et al., 1985), Upper Zambezi (Jubb, 1967), Kafue (RUSI 21592), the Luapula River (Worthington, 1933b; Ricardo-Bertram, 1943), Lake Malawi (Worthington, 1933a), the lower Shire River (Tweddle and Willoughby, 1979), the lower Zambezi and lower Pungwe River swamps (AMG 6387, 3668), as well as Lake Bangazi and the Mkuze River swamps in Maputaland, South Africa (Blaber, 1978; Taylor, 1982). It is possible that specimens referred to as *C. nanum* from the Zaire River basin (Luachimo R., Cachi R., Cuilo R., and Lucoge R.) by Poll (1967) may be *C. intermedium*.

Biology: *C. intermedium* inhabits densely vegetated floodplain and swamp habitats (Van der Waal and Skelton, 1984; pers. obs.). The species is a bubble nest spawner (Cambray, pers. comm.).

Etymology: Based on the comparisons made by Pellegrin (1920) it appears that *C. intermedium* was named for the intermediate position of its taxonomic characters relative to *C. nanum* and *C. ansorgii*.

DISCUSSION

Pellegrin's (1920) description of *Ctenopoma intermedium* has since been overlooked in the scientific literature. It appears that there are several reasons for this neglect, probably the main one being simple oversight by workers not thoroughly familiar with the literature. The fact that a figure was not provided to facilitate identification and association of the species is possibly significant in this regard. In addition the species is small and uncommon and so did not occur often in systematic collections (e.g. Jackson, 1961; Van der Waal and Skelton, 1984).

Another reason is probably that the initial identifications and comparisons made by Worthington (1933a, b) were only to species ilustrated in the literature and present in the British Museum of Natural History.

The relationships of *C. intermedium* are clearly within the group of small narrow-bodied species (Banister and Bailey, 1979) that are bubble nest breeders. The general similarity of several of these species such as *C. ctenotis*, *C. nanum*, *C. congicum*, *C. davidae*, and *C. damasi* with *C. intermedium* is a useful indication but only a general guide to the phylogenetic relationships (Hennig, 1966; Wiley, 1981). Further phylogenetic studies are necessary to determine suitable synapomorphies on which to base such relationships.

C. intermedium is a rare species in South Africa (Skelton, in press). Although it is relatively uncommon in collections this is not an accurate indication of its conservation status in other areas of its natural range. Its natural preference for shallow swamps and floodplain habitats could expose the species to certain man-made threats including insecticide spraying (e.g. in the Okavango-Kwando-Chobe area) and habitat destruction as a result of swamp draining and river regulation (e.g. in the lower Zambezi from the Lakes Kariba and Cahora Bassa (Davies, 1986). It is fairly easily maintained and is known to breed in aquaria (Cambray, pers. comm.), factors which are in favour of its conservation should the need for such action become necessary.

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